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(19)

(54) INDUSTRIAL FORK LIFT TRUCKS

(71) We, COVENTRY CLIMAX ENGINES LIMITED, a British Company of Widdrington Road, Coventry, Warwickshire do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to industrial fork lift trucks. The invention is particularly though by no means exclusively, applicable to lift trucks for handling sheet steel coated with material having a low friction coefficient.

According to a first aspect of the present invention an industrial fork lift truck for use in handling a load composed at least in part of ferromagnetic material includes magnetic field generating means mounted on the truck whereby a magnetic field can be generated to restrain free movement of the load on the forks of the truck.

According to a preferred embodiment of the first aspect of the invention the field generating means includes a pair of electro-magnets disposed symmetrically on either side of the forks.

According to a second aspect of the invention a method of retaining on an industrial fork lift truck a load composed at least in part of ferromagnetic material comprises the steps of:

(i) disposing the load on the forks of the fork lift truck with a part thereof within a given distance from a datum position; and

(ii) generating in the vicinity of the datum position a magnetic field of sufficient strength to restrain free movement of the load on the forks.

An embodiment of the invention will now be described with reference to the accompanying drawings of which:

Figure 1 is a perspective view;

Figure 2 is a side view; and

Figure 3 is a front view of a fork lift truck.

Forks 11 are mounted on a carriage 12 which is in turn mounted on the front of a fork lift truck body 13. The carriage 12 is adapted for vertical movement and additionally for canting movement by hydraulic means 21 (Figure 2) in a conventional manner.

Mounted on the carriage for movement with the fork are electromagnets 14, 15 comprising coils housed in, respectively, casings 16, 17 of ferro-magnetic material. The housings serve as stops to restrain movement of a load on the forks and spreads out the magnetic restraining force to greater effect. The electro-magnets are energised by way of cable 22 passing over reel 23.

The load 18 (shown in ghosted outline) of steel sheets coated in low friction lacquer are supported by the forks 11.

In order to ensure that the load 18 is disposed on the forks sufficiently close to the electro-magnets 14, 15 sensing switches 19, 20 are provided on the truck inboard of the electro-magnets. In this case the switches 19, 20 are mechanically operated electric switches which are only closed when the load is within ¼'' of the housings 16, 17. The switches 19, 20 are incorporated in circuitry which provides for an audible signal to sound and a red light signal 24 to show when the magnets are switched on and the gap between load and the housings 16, 17 exceeds ¼''. When the gap is reduced below ¼'', such as by pushing the load 18 further onto the forks, the audible signal ceases and the red light signal is replaced by a green light signal 25. If necessary additional safety features could be incorporated to ensure that the load 18 is suitably close to the electro-magnets 14, 15. Thus vehicle movement could be governed by the switches 19, 20 so that, with the switches open indicating that the load is over ¼'' from the housings 16, 17, the vehicle movement would be limited to a slow speed or even prevented from moving or some of its fork operations would be inhibited. Such safety features would be particularly applicable to electrically powered lift trucks.

[*Price 33p*]

In the present case the truck has as prime mover a petrol engine which in addition to providing motive power for the truck and generating hydraulic pressure for the fork movements also serves to generate electrical power for the electro-magnets 14, 15.

In use the truck driver ensures that the electro-magnets 14, 15 are energised while the load 18 is supported on the forks 11 sufficiently close to the housing 16, 17 to operate switches 19, 20. The resulting magnetic field acts to draw the load 18 against the casing 16, 17 so maintaining the load on the forks despite movement or inclination of the truck while in operation. When the load 18 is to be unloaded the forks 11 are lowered in the usual way until the load is supported on pallet members. The electro-magnets 14, 15 are then de-energised and the forks withdrawn by reversing the truck.

Picking up a load is the reverse procedure to that described above. The truck is driven with forks 11 lowered to position the load above the forks and in contact with housing 16, 17. The forks 11 are then raised to lift the load clear of its previous supports to the normal load transporting position. The electro-magnets 14, 15 are then energised to generate a field acting to retain the sheets of the load on the forks against the casing 16, 17.

The invention allows ferromagnetic loads to be handled without the need to bind or otherwise restrain the individual components of the load. Thus time needed to prepare the loads is minimised or eliminated and truck utilisation improved.

WHAT WE CLAIM IS:—

1. An industrial fork lift truck for use in handling a load composed at least in part of ferromagnetic material including magnetic field generating means mounted on the truck whereby a magnetic field can be generated to restrain free movement of the load on the forks of the truck.

2. An industrial fork lift truck as claimed in Claim 1 in which the field generating means includes a pair of electro-magnets disposed symmetrically about the forks.

3. An industrial fork lift truck as claimed in Claim 1 or Claim 2 including load sensing means so adapted as to indicate when a load disposed on the forks of the truck exceeds a predetermined distance from the field generating means.

4. An industrial fork lift truck as claimed in Claim 3 in which the load sensing means is so adapted as to cause operation of the truck to be inhibited or the speed of the truck to be reduced when a load disposed on the forks of the truck exceeds the predetermined distance.

5. An industrial fork lift truck as claimed in Claim 3 in which the load sensing means is so adapted as to generate a warning signal when a load disposed on the forks of the truck exceeds the predetermined distance.

6. A method of retaining on an industrial fork lift truck a load composed at least in part of ferromagnetic material comprising the steps of:

(i) Disposing the load on the forks of the fork lift truck with a part thereof within a given distance from a datum position; and

(ii) generating in the vicinity of the datum position a magnetic field of sufficient strength to restrain free movement of the load on the forks.

7. An industrial fork lift truck as hereinbefore described with reference to, and as illustrated by, the accompanying drawings.

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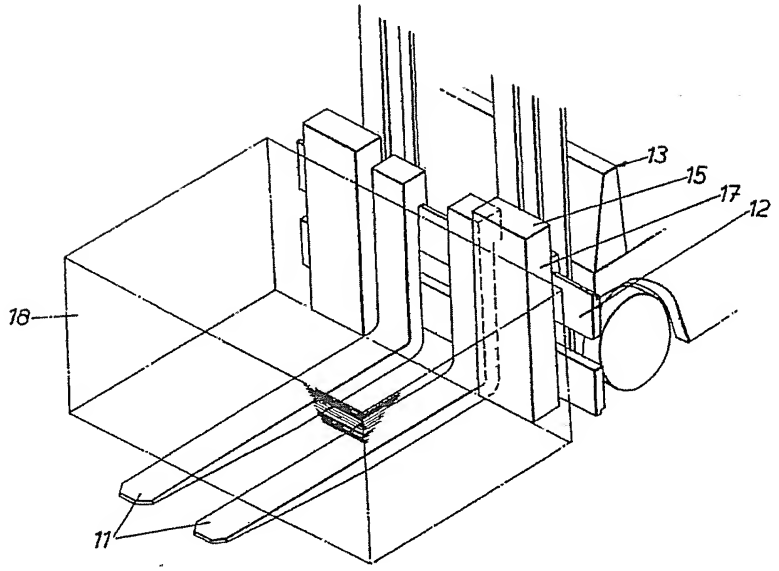
1406036 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

FIG.1.



1406036 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

FIG.2.

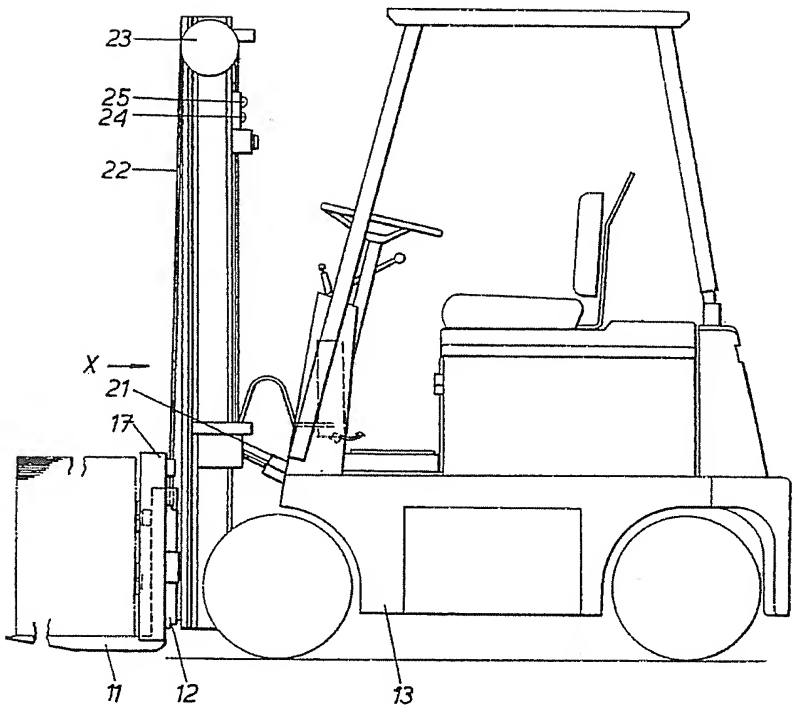


FIG.3.